Space Weather Forecast

Issued on Friday, 12 May 2023 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate geomagnetic storm conditions expected on 12 and 13 May, with a chance of G3/Strong storms due to an expected CME (coronal mass ejection) arrival. S1/Minor Solar Radiation Storm easing. R1/R2 Minor/Moderate radio blackouts expected.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Moderate, with two Moderate class flares, from a mature, but developing region in the southwest quadrant. This region has produced two CMEs in the last 24 hours, one with a possible Earth-directed component, and one which is yet to be fully analysed. Two previously active regions in the northwest quadrant, appear to have stabilised. The remaining five of nine numbered regions all appear to be stable or benign. Aside from the CME mentioned, no further Earth-directed CMEs have been identified on available imagery.

Solar Wind / Geomagnetic Activity: The solar wind has been at elevated levels throughout, but with an initially declining trend. This then levelled out late in the period, perhaps due to a weak shock ahead of a forecast CME arrival. Total magnetic field strength was weak, but also showed a slight increase towards the end of the period, but the north-south component varied weakly and was unremarkable. Geomagnetic activity has been Quiet to Unsettled.

Energetic Particles / Solar Radiation: Solar radiation declined below the S1 Minor Solar Radiation Strong threshold over the past 24 hours, with a peak of 22pfu at 11/0000UTC on a declining trend, falling below threshold at 11/0400UTC.

Four-Day Space Weather Forecast Summary
Solar Activity: Moderate to High solar activity is forecast to continue through the next four days, due to a combination of activity from AR3296, AR3297 and AR3294. There is a likelihood of Moderate flares and a chance of Strong flares.

Solar Wind / Geomagnetic Activity: A full halo CME which left the Sun on 09 May was due to arrive at Earth on 11 May, and although a limited shock has been observed, a more significant shock is still forecast. The effects on the speed, density and magnetic strength from the CME could continue into 13 and 14 May, and could mask a possible fast wind connection on 13 May. Geomagnetic activity is forecast to start Quiet, becoming Unsettled to Active due to the onset of the forecast CME, with G1 or G2 (Minor or Moderate) Storms expected. There is also a chance of G3 (Strong) storms, especially during the initial shock of the CME. Continued storm intervals, with a declining strength are then possible through 13 May, with any further G1 or G2 storm intervals on 14 and 15 May dependent on the magnitude of the initial shock.

Energetic Particles / Solar Radiation: Solar radiation levels are likely to gradually decline to background levels during the coming days, though the risk remains for further enhancement, mainly due to the chance of significant flares from the largest sunspots in the northwest and the onset of the CME arrival on 12 May, with effects potentially lingering through the forecast period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	90	80	20	10
Strong	G3	No	50	30	5	1
Severe	G4	No	15	10	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	50
Very Active	R3 to R5 X	No	20	15	15	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	50	30	20	20
Very Active	≥ S3 *	No	5	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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